**Salt Lake Community College, Chemistry Department**

**Chem 1110 Workshop 4**

**Topic: Ionic Compounds**

***Objective:***

* Ions and Ionic compounds
* Ions of Some Common Elements
* Empirical Formula
* Lewis dot structure
* Formulas of Ionic Compounds

**Ions:**

* **Ions** - atoms with an electrical charge
* In general: metal atoms tend to lose electrons to form cations, nonmetal atoms tend to gain electrons to form anions.

**Ionic Compounds:**

The behavior of the atoms in forming bonds or ions can be predicted by their position in the Periodic Table.

1. Is the element a metal or a nonmetal?
2. Of which group is the element a member?
* Ionic compounds – usually combinations of metals and nonmetals, NaCl.

**Ions of Some Common Elements:**

atom Na: 11 e−; the closest noble gas Ne: 10 e–

atom Na − 1 e − → Na+ (metal)

atom Cl: 17 e−; the closest noble gas Ar: 18 e−

atom Cl + 1 e− → Cl− (nonmetal)

 

**Empirical Formula:**

The empirical formula of a compound is the simplest whole number ratio of atoms in the compound. Remember: the total charge of a compound is zero.

**Lewis electron dot structures (Lewis structures) for atoms**

A. Lewis structures generally consist of the elemental symbol surrounded by one dot for each valence electron of the substance

B. Valence electrons are the outer shell s and p electrons

**Practice problems:**

1.Write the Empirical Formula of the following ionic compounds formed by:

* 1. Al3+ and O2- -> Al2O3
	2. Mg2+ and NO3- 🡪 Mg(NO3)2
	3. Cr3+ and Cl- 🡪CrCl3
	4. Fe3+ and Br- 🡪 FeBr3
	5. Ca2+ and O2- 🡪 CaO
1. Identify the valence electrons in the following elements and draw Lewis Dot structure:

|  |  |  |
| --- | --- | --- |
| **Elements** | **Valence Electrons** | **Lewis Dot Structure** |
| K | 1 |  Kꞏ |
| Ca | 2 | ꞏCaꞏ |
| Al | 3 | ∙Al∙ (3 dots) |
| Ba | 2 | ꞏBaꞏ |
| Na | 1 |  Naꞏ |

1. Determine the charge on each atom for the following ionic compounds:

|  |  |  |
| --- | --- | --- |
| **Ionic Compounds** | **Metal (Cation)** | **Nonmetal (Anion)** |
| CrCl3 | Cr3+ | Cl- |
| FeO | Fe2+ | O2- |
| TiO2 | Ti4+ | O2- |
| PbBr2 | Pb2+ | Br- |
| Al2O3 | Al3+ | O2- |

1. Using Lewis symbols, write the reaction formation of the following:

|  |  |  |
| --- | --- | --- |
|  | **Lewis dot Structure + Lewis dot Structure**  **(Metal) (Non-Metal)** | **Reaction Formation (Ionic Compound)** |
| NaCl from Na and Cl | Naꞏ + Cl (7 dots) | Na+[Cl (8 dots)]- |
| CaS from Ca and S | ꞏCaꞏ + S (6 dots) | Ca2+[S (8 dots)]2- |